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Your Petitioner, Bruce H. Dalrymple, a citizen of the United States of America and resident of the State of Georgia, whose residence and mailing address is 5380 Emmett Still Road S.W., Loganville, Georgia 30052, prays that Letters Patent Protection be granted to him for a

METHOD OF FORMING BOX WITH GUSSETED CORNER

as set forth in the following specification:

Cross-Reference to Related Utility and Provisional Patents

This continuation application claims priority based on previously filed provisional and utility patents, specifically on the provisional patent application Serial No. 60/327,523 filed October 5, 2001 and to utility patent application Serial No. 10/264,652 filed October 5, 2002.

Background of the Invention

1. Technical Field

The present invention relates to boxes having reinforced corner structures and, more particularly, to a generally rectangular box having gusseted corner construction and a method of forming the same in which the box is formed from a single blank on which the gusset corners are formed, the box then being assembled to provide for storage of materials therein and a method of forming the same which includes construction of the gusseted corners prior to assembly of the box.

2. Description of the Prior Art

In the field of paper box design and construction, there are several different design and construction elements which affect the strength and cost of the box. Among these are the type and thickness of paper product used in the construction of the box, the design of the box in unassembled and assembled positions and the wall and corner construction of the assembled box. Each of these factors is important in constructing an efficient and economical box for the following reasons.

Regarding the paper product used in the construction of the box, it has been found that even a small reduction in wall thickness will produce a large cost savings to the box purchaser, and therefore it is desirable to use the thinnest possible construction materials in the construction of the box. Of course, however, a wall which is too thin will not permit stacking of assembled boxes atop one another or can provide insufficient protection for the contents of the box, which is undesirable. The box manufacturer thus has two options, to make the wall thickness greater or to provide reinforcement for the walls, particularly the corners, of the assembled box. As the increased thickness is not a viable option, it then becomes imperative to design a box which includes reinforced wall, particularly corner, construction.

A second concern for the box designer is to design a box which can be transported in an unassembled, generally flat position and which can be assembled by the end user as needed to package goods. The transport of pre-assembled boxes results in greatly increased shipping costs, as much of the shipping space is taken up by the

1 interior volume of the assembled boxes. Also, the storage of pre-
2 assembled boxes requires greater room, which many businesses cannot
3 allocate without sacrificing space which is sorely needed for
4 business operations. It is therefore seen that there is a need for
5 a box design which can be transported in a generally flat
6 unassembled position yet can be quickly and easily assembled by the
7 end user for packaging needs.

8 Yet another concern for the box designer is directly related
9 to the use of the box by the end user, and that is the nature of
10 the corner construction of the box. As was stated previously, the
11 strength of the box is dependent on the wall thickness and corner
12 construction of the box, and thinner wall construction is desirable
13 to reduce shipping weight and construction costs, thereby
14 increasing the profitability of the box. To maintain the
15 structural strength of the box, then, the corners of the box must
16 be constructed to support not only the weight of the box itself,
17 but also the weight of boxes and contents stacked on top of the
18 box. It is important to note that the higher boxes can be stacked
19 without risking box failure, the greater the savings in storage
20 costs, as less floor space is needed for storage. There is
21 therefore a need for a box which uses relatively thin wall
22 construction material yet incorporates reinforcement structures in
23 the corners thereof to permit the stacking of multiple boxes.

24 Therefore, an object of the present invention is to provide an
25 improved box having gusseted corners.

26 Another object of the present invention is to provide a box
27 having gusseted corners which includes upright gusset structures
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1 formed in each of the corners of the box, the gusset structures
2 being formed during the assembly of the box from the flat blank to
3 the finished box structure.

4 Another object of the present invention is to provide a box
5 having gusseted corners which is constructed of thinner wall
6 construction paper product than that used with similar size and
7 type boxes found in the industry.

8 Another object of the present invention is to provide a box
9 having gusseted corners which can be stacked with product therein
10 to a greater height than that permitted by using prior art boxes.

11 Another object of the present invention is to provide a box
12 having gusseted corners which quickly and easily folds from a
13 generally flat transport position to the folded assembled position.

14 Finally, an object of the present invention is to provide a
15 box having gusseted corners which is relatively simple to
16 manufacture and which is safe and durable in use.

Summary of the Invention

The present invention provides a box with gusseted corners which includes a plurality of walls each connected to and extending generally upright from a base wall thereby forming the box. A plurality of corner gussets each extend between and strengthen adjacent ones of the walls. Each of the corner gussets include a gusset corner formation wall section foldably connected to and extending from one of the walls, and the gusset corner formation wall section has a first fold extending generally parallel with the foldable connection to the wall, the first fold dividing the gusset corner formation wall section into an upper portion and a lower portion. The lower portion extends generally perpendicular from the wall and the upper portion is angled towards the wall wherein the upper and lower portions of the gusset corner formation wall section form an acute angle therebetween. The upper portion of the gusset corner formation wall section further includes a glue flap section adapted for adhesive connection to the wall such that the upper portion and the lower portion of the gusset corner formation wall section cooperate with the wall to form one of the corner gussets.

The box as thus described clearly offers several advantages over those devices found in the prior art. The relatively simple design and easy assembly of the present invention permits the box to be shipped to the end user in unassembled form, thus presenting a great savings in shipping costs. Also, because the box is constructed of thinner wall material than similar boxes currently on the market, the production costs of the box are substantially

1 reduced. Furthermore, because the box includes gusseted corner
2 construction, a plurality of boxes can be stacked with product
3 therein to a greater height than that permitted by using prior art
4 boxes. The present invention thus provides a substantial
5 improvement over those devices found in the prior art.

1 **Brief Description of the Drawings**

2 Figure 1 is a perspective view of the formation method of the
3 present invention showing the formation of the gusseted corners
4 from the generally flat blank prior to assembly;

5 Figure 2 is a detail perspective view of the assembly method
6 of the present invention;

7 Figures 3a and 3b are, respectively, top plan and perspective
8 views of the assembled box exhibiting the corner gussets formed
9 therein; and

10 Figures 4a and 4b are detail rear elevational views of the
11 bending and forming stages of the box formation method of the
12 present invention.

Description of the Preferred Embodiment

The box with gusseted corners **10** of the present invention is shown best in Figures **1-4b** as being constructed from a single flat blank **12** which, when assembled, forms the box with gusseted corners **10**. In the preferred embodiment, flat blank **12** would be placed on a feed conveyor (not shown) and be fed into the gusset construction section of the box assembly line. As shown best in Figures **1** and **2**, the gusset assembly section **30** would include a pair of rotatably mounted kicker wheels **32a** and **32b** which are mounted adjacent to and parallel with the direction of travel of the blank **12**, the kicker wheels **32a** and **32b** operative to deform the gusset corner formation sections **14a, 14b, 14c, 14d** of the blank **12** upwards to a generally upright position as shown best in Figure **2**. As the blank **12** is moved forwards on the conveyer belt, the kicker wheels **32a** and **32b** alternatively rotate to move kicker plates **33a** and **33b** into forming position wherein the gusset corner formation sections **14a-d** are tilted upwards to a generally upright position, as shown best in Figure **2**. As each kicker wheel **32a** and **32b** rotates, the kicker plate **33a** and **33b** associated therewith is pivoted into a bending position or is pivoted downwards to disengage from the blank **12**, thereby only deforming those sections of the flat blank **12** which should be pivoted upwards.

As the blank **12** continues to be moved forward by the conveyor system, the now upwardly extending gusset corner formation sections **14a-d** each encounter in turn the forming blades **34a** and **34b**, depending on the side of the blank **12** on which the gusset corner formation sections **14a-d** are positioned. As shown best in Figures

1 **2, 4a** and **4b**, each forming blade **34a** and **34b** is designed to engage
2 and fold the gusset corner formation section **14a-d** on its
3 respective side.

4 As each gusset corner formation section **14a-d** is pivoted into
5 generally upright position, slots **35a** and **35b** engage the gusset
6 corner formation section **14a-d** adjacent the lower portions thereof
7 to prevent improper bending of the gusset corner during the
8 formation process. In the preferred embodiment shown best in
9 Figures **4a** and **4b**, slots **35a** and **35b** would consist of pairs of
10 generally parallel spaced plates between which the gusset corner
11 formation sections **14a-d** slide. As the flat blank **12** is moved
12 forward on the conveyer belt, each gusset corner formation section
13 **14a-d** encounters one of the forming blades **34a** and **34b**. As each of
14 the forming blades **34a** and **34b** are designed and operate in
15 substantially similar manners, the following description of forming
16 blade **34a** should be understood to apply equally to forming blade
17 **34b**.

18 In the preferred embodiment, and as best shown in Figures **4a**
19 and **4b**, forming blade **34a** would include a forwardly extending
20 curved engagement section **36** which curves outwards to engage the
21 outer face of the gusset corner formation section **14c** as it
22 approaches. The forming blade **34a** further includes a center curved
23 deforming section **38** which acts to bend the upper portion of the
24 gusset corner formation section **14c** downwards. Because the lower
25 portion of the gusset corner formation section **14c** is held within
26 the slot **35a**, only the upper portion of the gusset corner formation
27 section **14c** is bent downwards along a line defined by the top of
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1 the slot **35a**. Finally, as the blank **12** continues to move forward
2 on the conveyor, the gusset corner formation section **14c** continues
3 to be engaged by the forming blade **34a**, in particular the rear
4 section **40** of forming blade **34a** which presses the formed gusset
5 onto the side wall **16b** to which the gusset corner formation section
6 **14c** is attached. This completes the folding formation of the
7 gusset.

8 The recently formed gussets **20a** and **20b** are now engaged by a
9 pair of glue compression rollers **42a** and **42b** which each engage a
10 respective glue flap **18a** and **18b** of the gussets **20a** and **20b**,
11 securing the glue flap **18a** and **18b** to the side wall **16a** on blank
12 **12**. Upon drying of the glue, the gussets **20a** and **20b** are now
13 formed and the assembly of the box **10** can continue, with the final
14 assembled shape of the box including the four corner gussets **20a-d**
15 as shown best in Figure **3a** and **3b**.

16 The box **10** itself when constructed would include side walls
17 **16a**, **16b**, **16c** and **16d**, base wall **18**, gussets **20a-d** and lid **22** and
18 would preferably be constructed of cardboard or the like, depending
19 on the desired performance characteristics. The inventive
20 characteristic of the box **10**, however, are the gussets **20a-d** which
21 permit the stacking of more boxes on top of one another than is
22 permitted by the prior art. As the gussets **20a-d** are formed
23 integrally with the rest of the box, the gussets **20a-d** are likely
24 stronger than gussets found in the prior art. Furthermore, the
25 relatively simple construction of the gussets **20a-d** means that they
26 will perform their intended task with less likelihood of failure.

27 When compared to the prior art, the method of the present
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1 invention is far superior as the box **10** is constructed from a
2 single flat blank and can thus be assembled either at the box
3 manufacturer or at the customer's plant location. Furthermore, the
4 manufacturing and assembly process is relatively simple compared to
5 those processes found in the prior art, thus decreasing the
6 manufacturing time and cost for the box **10** of the present
7 invention.

8 It is to be understood that numerous modifications, additions,
9 and substitutions may be made to the box with gusseted corners **10**
10 of the present invention which fall within the intended broad scope
11 of the preceding description. For example, although the
12 construction materials of the box with gusseted corners **10** is
13 preferred to be a heavy-gauge paper or the like, numerous other
14 types of construction materials may be substituted which fulfill
15 the intended functional characteristics of the box. Also, the
16 precise size, shape and dimensions of the box with gusseted corners
17 **10** of the present invention may be modified and/or changed so long
18 as the functional characteristics are not modified and or
19 destroyed. Finally, the precise angle of the gusset structures
20 **20a-d** may be modified or changed, along with the precise method of
21 manufacture, so long as the support function of each of the gussets
22 **20a-d** is maintained.

23 There has therefore been shown and described a box with
24 gusseted corners and method of forming same which accomplishes at
25 least all of its intended objectives.